

Incubation and ascites

By Ron Meijerhof

Traditionally hatcheries are judged by their hatch results, and then more specifically by their hatch of fertile. If we did look at chick quality coming from a hatchery, it was normally limited to the mortality in the first week after placement. In the last decade people have been getting more and more aware that incubation conditions do not only influence hatchability, but also broiler results later in life. By itself this is logical: if you kill an embryo by poor incubation conditions, probably the embryos that didn't die but experienced the same conditions were not developing in an optimal way as well. Although the amount of data is still limited, it becomes more and more clear that the economical impact of the loss of chick quality might be much higher than the costs of the reduced hatchability. Especially when differences in incubation conditions result in differences in growth and feed conversion, as some researchers have demonstrated, the costs of poor incubation can increase quickly.

In recent years it has become clear that the temperature of the egg is crucial for chick quality and hatching results. Especially too high temperatures at the end of incubation have a detrimental effect not only on survival rate of the embryos, but also on the development and later performance of the chicks. If we look at what happens in an embryo, this is not totally unexpected. If embryo temperatures go up, the embryo is using energy at a high rate, and as the speed at which it can mobilize energy from the yolk is limited, at the end of the incubation it can face a relative shortage of energy. To be able to survive, the embryo has to find alternative sources of energy, and as a result it will burn protein for that purpose. This means that protein in the yolk will not be used for building up the body anymore, but will be burned for energy. As a result less protein will be available for formation of body tissue and other crucial body functions, which obviously will influence development and consequently later performance.

Although the effect of high temperatures on development of the embryo is still a subject of intensive research, it is already known for several years that embryo temperature during incubation influences heart size. Several researchers have shown a significant smaller heart if embryo temperatures are increased. Results vary to some extent between the different experiments, but a general trend seems to be that an increase from 100oF to 102oF decreases the heart size of the day old chicken with approximately 20%. It has also been shown that after a week, this difference still remains. As the heart is an important engine of the body, this might very well explain the decreased growth rates in

broilers after high embryo temperatures in incubation, as reported for instance by Mike Hulet of Penn State University (Hulet et al: Poult. Sci. 2007 86: 408-412).

A recent experiment also looked at the incidence of ascites after high incubation temperatures (Molenaar et al: Poult.Sci. 2011 90: 624-632). For this experiment, eggs were incubated at an egg shell temperature of either 100oF or 102oF. After hatching, chicks were grown in a cold or normal environment. Although the cold grow out conditions resulted in more ascites as was expected, in both environments the higher embryo temperature resulted in a significant increased level of ascites, approximately twice as high as when the chicks were incubated at an embryo temperature of 100oF. This suggests that the differences in heart development that are created by the incubation conditions do affect the birds later in life, and that control of the climatic conditions and then especially of the egg shell temperatures are crucial for later performance.

To obtain optimal performance in our broilers, we must give them the best start possible. And incubating them in the correct way and therefore allowing the embryo to develop in a good quality day old chick is a crucial aspect of giving them a good start.